UNCLASSIFIED- SOVIET BLOC INTERNATIONAL GEOPHYSICAL YEAR INFORMATION

(71)

PB 131632-70

INFORMATION ON SOVIET BLOC INTERNATIONAL GEOPHYSICAL COOPERATION - 1959

June 12, 1959

U. S. DEPARTMENT OF COMMERCE
Office of Technical Services
Washington 25, D. C.

Published Weekly
Subscription Price $12.00 for the Series

INTERNATIONAL GEOPHYSICAL COOPERATION PROGRAM-- SOVIET-BLOC ACTIVITIES

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Approved For Release 1999/09/08 : CIA-RDP82-00141R000200710001-4

I. GENERAL

IGY World Data Center, Moscow

The World Data Center created in Moscow in accordance with the decision of the Special (International) Committee for the Conduct of the International Geophysical Year is charged with the collection, storage, and distribution of IGY data which is received at the center from stations all over the world which conduct observations according to the IGY program. The center's address is Moscow, V-296, Molodezhnaya Ulitsa, D. 3.

The center contains reading rooms and suitable apparatus for working with materials. In addition to this, for a fixed fee, the center will send microfilms of any material in its possession to interested persons or institutions. For working with materials stored at the center, interested persons need only to have permission from the organizations where they work. ("Creation of the World Center for the Collection, Storage and Distribution of IGY Data;" Moscow, Izmeritel'naya Tekhnika, No 4, Apr 59, p 41)

An Izvestiya article on World Center "B" gives more details. Over 600,000 systematized tables with the results of scientific observations according to the Third IGY program have already been stored in World Center "B" in Moscow.

The center is broken down into two subcenters. In subcenter "B-1," which recently took up quarters in a fine new building near Moscow State University in Lenin Hills, all material on meteorology, oceanography, and glaciology is concentrated. In subcenter "B-2", on Chkalov Street the data complex of magnetology, the ionosphere, the aurorae, and cosmic radiation is received via post, radio, and telegraph.

The interest of scientists all over the world in the material collected in World Center "B" in Moscow is very great. Attention appears to be fixed especially on the results from studies on cosmic rays, in the investigation of which, using rockets and artificial Earth satellites, Soviet Scientists have achieved outstanding successes. The Moscow center has already sent 70,000 tables of observations to different countries in the world in answer to requests from abroad. ("In World Center 'B'"; Moscow, Izvestiya, 20 May 59, p 6)

Study on Transfer of Czechoslovak Geodetic Network to Krassovskiy Ellipsoid

The trigonometric network in the area of Czechoslovakia, based on the Bessel ellipsoid, with the plotted point at Hermannskogel, was supposed to be transferred to the Krassovskiy ellipsoid, with the plotted point at Pulkovo. In 1950, the author of the uniform catastral network J. Krovak, (since deceased) prepared an outline of the transformation of the Czechoslovak trigonometric network from one ellipsoid to another by means of plane coordinates of general conformal conical mapping, defined identically on both ellipsoids.

This article derives two different variants of the Krovak transformation. The first variant was used for the preliminary transformation of the Czechoslovak trigonometric network from the Bessel to the Krassovskiy ellipsoid of the Soviet coordinate system (so-called 1942 system). The second variant makes it possible to transfer the trigonometric network from one ellipsoid to another with a minimum longitudinal distortion (plus-minus 0.03 mm for the area of Czechoslovakia). ("On Two Variants of the Krovak Coordinate Transformation of Trigonometric Points from One Ellipsoid to Another Ellipsoid," by M Pick, Geophysics Institute of the Czechoslovak Academy of Sciences, Prague; Prague, Studia Geophysica et Geodaetica, Vol 2, No 3, 1959, pp 112-115)

First Anniversary of Sputnik III Launching Noted in Soviet Press

The first anniversary of the launching of Sputnik III occurred on 15 May. The event was commemorated in the Soviet press with many articles, selections from which are given here.

Academician Leonid I. Sedov, chairman of the Interdepartmental Commission on Interplanetary Communications, Academy of Sciences USSR, hailed the launching of Sputnik III as an outstanding triumph of Soviet science and engineering and a new demonstration of the vitality and capability of the socialist structure.

Sputnik III's transmitter, Mayak, operating from solar batteries, continues sending its signals, which are received in all the countries of the world. In this connection, Sedov describes his visit with Australian scientists in that country, where very good studies are being conducted of the radio signals and of certain very curious pecularities of recordings of these signals. Sedov says the visit will undoubtedly contribute to closer cooperation between Australian and Soviet scientists, a very desirable and useful situation, since very valuable recordings of the signals, with measurements of cosmic rays in the atmosphere of the Southern Hemisphere at altitudes of about 1,800 kilometers, have been obtained in Australia.

The visit included trips to the Main Astronomical Observatory near Canberra (where the first pictures of Sputnik I were made) and other scientific institutions of Australia and New Zealand. The Soviet delegation acquainted itself with the organization and operation of these institutes and in particular had the opportunity of observing the research work connected with the soviet artificial satellites and the study of the upper layers of the atmosphere.

In the field of investigating cosmic space, says Sedov, international cooperation is extremely useful and helps in bringing into this work many serious scientists from different countries. The cooperation and mutual exchange of information by scientists of all countries is an important factor for obtaining scientific successes with a minimum of expense and in the shortest time. In the Soviet Union, data on satellites and the cosmic rocket acquired with the aid of cosmic flights is widely published.

There is no doubt, Sedov continues, that the changing-over of materials and efforts from military rocket engineering to scientific research in the cosmos will show a favorable effect on strengthening peace between the peoples of the world and will favor new successes in man's struggle to master the elementary forces of nature.

The prospects for the future in the field of interplanetary flight is tremendous. The results achieved thus far are only the beginning. There are rockets already available which will permit making cosmic flights to the Moon and to the nearest planets. The positive solution of the problem of man's flight is cosmic space is possible; its realization now depends mainly on the solution of a number of problems connected with the safety of a man in cosmic space, with his protection against the effects of different kinds of radiation, and with ensuring his safe return to Earth. There is no doubt that these problems will be successfully solved.

"We have every reason to assume," says Sedov, "that the grandiose plans of technical progress set forth by the 21st Party Congress will be fulfilled and will serve as the basis for new, still greater successes of the USSR in the realization of interplanetary flights." Sedov concludes that Sputnik III will continue its flight throughout the summer and fall. ("Toward New Successes in Cosmic Flights," by Academician L. I. Sedov; Moscow, Pravda, 15 May 59)

Radio Functioning Normally

The radio transmitter Mayak aboard Sputnik III has been operating continuously for the past year. So far 1,200 kilometers of magnetic tape have been used in recording its signals.

The radio transmitter consists of two units, a main and a reserve transmitter and acommutating device and power sources. In case of failure of the main unit, provisions have been made for switching over to the reserve transmitter. This situation has not arisen, as the main transmitter has reliably performed its task up to now. At present, the radio has worked continuously for more than 8,000 hours. Of the total hours, the radio operated for more than 6,000 hours from the solar batteries and the remainder of the time from the chemical power sources.

The voltage selected for the solar batteries was such that when they are illuminated by the Sun it exceeds the voltage of the chemical power sources. Thus, the transmitter is fed by the solar battery and the chemical sources of power are not depleted. When the solar batteries are in shadow, the transmitter is fed from the electrochemical sources.

"The lengthy operation of Mayak made it possible to arrive at a number of important conclusions connected with the operating conditions of solar batteries in cosmic space," Prof M. Mikhaylov, a Soviet scientist. "It is possible to consider as established the fact that cosmic radiation, meteor erosion, and temperature shifts present no hazard to the operation of an efficiently designed solar battery." ("The Radio Mayak is Operating," by Prof M Mikhaylov; Moscow, Pravda, 15 May 59, p 4)

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Some Results

The discovery of a unique "aureole," consisting of an enormous accumulation of rapidly-moving, electrically-charged particles held by the Earth's magnetic field, by Sputnik III is of particular value for studying the conditions of cosmic flights. This discovery was confirmed by the latest investigations conducted with the Soviet cosmic rocket which was launched 2 January 1959.

Sputnik III's instruments made it possible to obtain valuable material on the over-all composition of the ionosphere at a height of from 230 up to 840 kilometers and to detect a marked increase in the concentration of ions at altitudes of about 1,000 kilometers, where, according to previous representations, it was supposed that only interplanetary gas existed.

Interesting results were obtained during precise magnetic measurements by the satellite. The detection of rapid variations in the intensity of the Earth's magnetic field at different altitudes made it possible to establish the presence of current systems in the upper atmosphere which create their own magnetic fields. As a result of studying the corpuscular radiation of the Sun an important conclusion was arrived at concerning the existence of streams of high-energy electrons in the upper atmosphere.

Interesting information having particular value for ensuring the safety of interplanetary flights was obtained as a result of the investigation of meteor particles. ("Famous Anniversary"; Moscow, Pravda, 15 May 59 p 4)

"A comparison of the new data obtained from the Soviet cosmic rocket with the data from artificial Earth satellites made it possible by our scientists to arrive at the conclusion, that the Earth is surrounded by two 'zones-belts' of intensive radiation. An analysis of the composition of the radiation showed the presence of X-rays, which arose during the bombardment of the body of the satellite and the container of the cosmic rocket by electrons. Moreover, it was shown that the outer zone of radiation is located at a distance from the Earth several Earth radii and contains comparatively low-energy electrons which may be absorbed by a thin layer of matter. The internal zone is located up to one Earth radius away and has an intensity of X-radiation dangerous for a living organism remaining in the upper atmosphere for a long time."

Although various hypotheses have been advanced concerning the physical processes leading to this radiation, the opinion of Soviet scientists that "...there is no particular basis to fear radiation illness in living beings who must fly to other planets"...is considered extremely reassuring. It is noted that this is true only at the time of a "quiet" Sun. The flight of the Soviet cosmic rocket toward the Moon occurred

during this period. With the occurrence of explosive processes on the Sun, which actually occur very rarely, it becomes the source of intensive cosmic radiation, and then, the entire solar system becomes filled with deadly radiation, the intensity of which and, consequently, also the degree of danger of which still must be determined. ("A Year in the Cosmos," by S. Nemchinov, Candidate of Physicomathematical Sciences: Moscow, Promyshlenno-Ekonomicheskaya Gazeta, 15 May 59, p 2)

Porous Cooling of Metal Walls Suggested as Solution of Re-Entry by Soviet Scientist

A study on the flow of gases through porous metal walls without heat exchange was made by Yu. V. Il'in of the Moscow Aviation Institute. The development of liquid rocket motors has led to successively higher temperatures and pressures in the combustion chamber and a resulting increase in the heat flux in the chamber walls. The method of porous cooling is considered promising in heat elimination. The method is also applicable, says the article, in high-pressure gas turbines and for developing means for returning scientific apparatus from satellites to Earth.

Il'in develops a theory of the hydraulic resistance of a porous medium, and the results of an experimental study are given. ("Gas Flow Through Porous Metal Walls," by Yu. V. Il'in, Moscow Aviation Institute; Kazan, Izvestiya Vysshikh Uchebnykh Zavedeniy, Seriya Aviatsionnaya Tekhnika, No 1, 1959, pp 65-73)

Soviet scientists and designers have been successful in performing remarkable deeds which only recently appeared to be audacious and fantastic dreams.

"The third Soviet artificial Earth satellite has already made 5,000 revolutions around the earth. On 2 January 1959, a multistage rocket was launched successfully toward the moon. This points to the possibility that a human being will be able to tread the surface of other planets in the not too distant future.

"It is up to aviation medicine to provide dependable safety devices for humans who may fly through outer space in a cosmic vehicle. Its task is to acquire a profound understanding of all dangers and complications which may be encountered by a human being flying in a rocket through outer space and the causes and mechanisms of changes in the physiological functions of the human organism. This is necessary so that a basis can be established for close cooperation with specialists in rocket technology who are trying to find ways to permit the human astronaut to surmount all obstacles in outer space.

"Oxygen starvation is the main danger to which a human flying through outer space is exposed. We have vast knowledge as far as that question is concerned. The ever-increasing drop in oxygen pressure in the alveolar air as altitude increases disrupts the entire process of respiration from pulmonary interchange of gases to tissue respiration. The brain, particularly the cerebral cortex, has an especially great sensitivity to oxygen deficiency. Even though powerful enzyme systems, which provide an anaerobic phase of respiration, participate in the repiratory cycle of brain tissues, the change-over during hypoxia to the utilization of energy from anaerobic processes is so wasteful and unproductive that irreversible changes take place very rapidly in the structure of brain tissues.

"The human organism is unable to alleviate the symptoms of oxygen starvation even when pure oxygen is breathed at an altitude of 10,000 meters above sea level. At an altitude of 16,000-17,000 meters the O_2 pressure in the lungs, during inspiration of pure oxygen, is almost zero. Oxygen, therefore, begins to pass from the blood into alveolar air in accordance with the law of diffusion. Experiments on animals revealed that acute anoxia appearing at those altitudes rapidly terminates in death.

"To protect a human being from acute oxygen starvation it is necessary to maintain air and O_2 pressure in the the cabin of the space vehicle at a level which would produce normal respiration. The need for this protective measure is also dictated by other dangers that threaten man in a rarefied atmosphere. The nitrogen (and subsequently the carbon dioxide) in solution in the human body begins to turn into a gaseous state at an altitude of between 8,000 and 10,000 meters. In a number of cases, this leads to appearance of so-called altitude decompression disturbances (most often to pain in the joints which, at times, is very severe).

"Symptoms of altitude decompression are closely associated with vapor formation. The tissue liquids begin to turn into vapors as soon as the external pressure drops below 47 millimeters of mercury (at an altitude of about 20,000 meters above sea level). This symptom is rapidly reversed following recompression.

"Hence it can be seen that the human occupant of a rocket, flying through space must, figuratively speaking, take a portion of the earth's atmosphere with him if he is to maintain life and efficiency.

"This principle is being realized in modern jet aircraft. They are supplied with hermetic cabins within which normal pressure is artificially maintained.

"However, hermetic cabins of the compressor-ventilated type, which are widely used in aviation, are designed for the comparatively dense layers of the atmosphere and are unsuitable for cosmic flights. Rockets require hermetic cabins that are sealed from the external environment, have closed and forced air exchange cycle, and in which an artificial microclimate is maintained.

"Considerable practical experience has been accumulated in air regeneration. This makes selection of an air regenerating system for a rocket cabin easier. As far back as the late 1930s, several people remained in a sealed cabin for 100 hours in experiments conducted under laboratory conditions. These were Professors M. Ye. Marshak, V. A. Spasskiy, L. L. Shik, and a navigator, A. V. Belyakov, who is known as the first person to make a nonstop flight to the US via the North Pole.

"A movie, shown last year by the Moscow Physiological Society, was made automatically during the flight of Soviet scientific-experimental rockets that reached altitudes of 100,000 meters, 200,000 meters, and higher. There were animals aboard such rockets in sealed cabins. The movie revealed that it was possible to completely guarantee the necessary barometric pressure and normal gas composition of the air during the entire flight and that it was possible to prevent fully any possibility of oxygen starvation, decompression sickness, or vapor formation phenomena

"It is also known that experiments have been conducted with rockets which flew into the ionosphere carrying monkeys in their cabins. Such flights were made in the US.

"Observations of the now famous flight of Layka, in a sealed cabin of the second Soviet artificial earth satellite, are of great significance. Highly active chemical compounds, liberating O_2 and absorbing CO_2 and excess water vapors, were used to regenerate the air and to maintain the necessary gas composition in this historical biological experiment. The amount of material involved in the chemical reactions was regulated automatically.

"The biological principles involved in providing an aircrew with oxygen are also of great interest in flights into outer space. Alga Chlorela Merits attention in connection with this. Algae actively emit oxygen when exposed to sun.

"Temperatures in the cabin of a space vehicle are of great significance. The systems of automatic thermoregulation, designed and constructed by the Soviet scientists and engineers, proved to be reliable. The temperature in the hermetic cabins of the third Soviet Earth satellite was maintained within the limits of 15-22°C above zero during the entire time that the instruments were in operation.

High altitude compensating suit and altitude helmet have been developed to protect the human space traveler from the cosmic environment in case of a sudden dehermetization of the cabin.

"The Soviet artificial Earth satellites have successfully completed thousands of revolutions around the earth. This proves that meteors in outer space need not cause concern.

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The ultraviolet radiation of the sun must also be taken into consideration in outer space. Humans have already penetrated the ozone zone in modern jet planes and in ozone-resistant stratosphere polyethylene balloons. This zone permits only that portion of ultraviolet radiation to reach the surface of the earth which borders directly on the violet end of the visible spectrum. In outer space, however, humans will be subjected to harmful action of short-wave ultraviolet rays. These rays may cause severe burns of the skin and acutely painful photo-ophthalmia. The insiduous effect of these rays is that they cannot be felt, because human beings have no receptors adequate enough to react to their action.

"Fortunately, protective measures against the penetration of short-wave ultraviolet radiation into the cabin of a cosmic vessel do not present any technical difficulties.

"The speed of flight of a rocket exceeds the speed of nerve impulses along the somatic nerves and even more so along the intrareceptor routes. Simple calculation shows that during an ordinary motor reaction to a visual signal (150 meters per second) a rocket would travel a distance equal to about 2,000 meters. We must take into consideration that the sense organs, which are adapted to a terrestrial existence, would not respond rapidly enough under new conditions and would not orient a human in outer space accurately or in time. For this reason we must make use of modern radio-electronic and automatic devices to help the human astronaut in piloting, navigation, etc.

"A pilot's movements are sharply limited by radial acceleration during the most critical period of a flight (when the engines are turned on), and upon entry into orbit it is possible that spatial orientation and preciseness of movements are disturbed (due to passing over into a condition of weightlessness). An automatic pilot will play an important role under such conditions. In addition, it will give the pilot a chance to turn his body into a position in which the effects of radial acceleration will be minimized.

"Experience acquired during the launching of experimental rockets with animals as passengers and when the second Soviet Earth satellite was placed into orbit showed that prolonged period of transverse acceleration are endured very well by animals. Identical data were obtained in observations of human subjects conducted under laboratory conditions.

"Cosmic rays to which a human being is subjected in outer space represent streams of atomic nuclei that have enormous potential energy and possess exceptionally high penetrating power. Scientific information on the intensity of cosmic radiation obtained with the aid of the artificial earth satellites and information relayed from the Soviet cosmic rocket will help to solve the problem of safeguarding astronauts from cosmic rays.

"The effect of weightlessness on the organism of animals and humans is also an important physiological problem. We already have some information on this: it was obtained after examining films, recordings of pulse beats, respiration, arterial and venous pressures, and electrocardiographs sent down to earth automatically. The prolonged period of observation of Layka in the artificial earth satellite proved to be quite valuable. A preliminary conclusion that can be reached as a result of all these observations is that the vitally important processes of respiration and blood circulation do not undergo any substantial changes under conditions of weightlessness.

"References can be found in the literature to the possible occurrence of illusory sensations, false sensations of body position in space, vertigo, and disturbances in delicate motor coordinations which arise as the result of brief periods of weightlessness (between 25 and 30 seconds). However, as the organism becomes adopted to such a condition these symptoms evidently disappear.

"The need for radical preventive measures were foreseen by K. E. Tsiolkovskiy. He proposed that an artificial gravitational force be created in the cabin of a cosmic ship by substituting a field of centripetal acceleration for the field of gravity of the earth.

"The Soviet scientists and technologists must solve the problem of reentry before a human being can be sent into space. There is no doubt that this problem will be successfully solved.

"The Soviet artificial earth satellites and the building and launching of the cosmic rocket which became a satellite of the sun demonstrated to the entire world the high level of scientific and technical progress in our country."

("Before Man Takes off Into Outer Space," by Prof D. Rozenblyum; Moscow Meditsinskiy Rabotnik, 21 May 59, No 38 (1786), p 2,)

Interest in Soviet Satellites High in China

A Peiping-datelined report from a Tass correspondent states that in the year which has passed since the launching of the third Soviet artificial Earth satellite, Chinese scientists of the Academia Sinica conducted numerous observations of the satellite. More than 20 special observation stations were created in various regions of the country for this purpose. The results of these observations are transmitted regularly to Moscow. The staff of workers in the Peiping Planetarium performed a great amount of work in acquainting the Chinese public with the achievements of Soviet scientists in the conquest of cosmic space. The associates of the planetarium organized an exhibit on the Soviet artificial satellites and of the first Soviet cosmic rocket, Mechta.

All of the countries motion picture theaters showed the documentary films, "The Launching of the Soviet Satellites and Observations of Them in China," "Artificial Satellite in the Sky," and also the Soviet films, "Road to the Stars," and "Flight to the Moon," with the Chinese language dubbed in. ("Enormous Interest in China in the Soviet Artificial Earth Satellites"; Moscow, Pravda, 15 May 59, p 5)

Conference on Rocket Engineering and Astronautics Held in Poland

The All Polish Conference on Problems of Rocket Engineering and Astronautics opened in Warsaw on 21 May. About 200 Polish scientists will participate. ("Brief Reports"; Moscow, Izvestiya, 23 May 59, p 3)

III. UPPER ATMOSPHERE

The New High-Power Radio Telescope of the Main Astronomical Observatory

The large radio telescope of the Main Astronomical Observatory of the Academy of Sciences USSR was built in 1956. At present, it has 90 reflecting elements, each 1.5 meters long and 3 meters high. These flat reflecting elements are placed along an arc segment ($2\Omega \approx 80°$) with a radius of 160 meters and are arranged as if touching the surface of an imaginary paraboloid with its axis directed toward the point of observation, while the points of contact lie in a horizontal plane passing through the focus of the paraboloid. The relatively high accuracy of the segmented reflecting surface of this new telescope is obtained through the exact positioning of its individual elements. The reflector converts the plane wave into a cylindrical wave with a vertical axis. The cylindrical wave is further converted into a spherical wave by a second parabolic cylinder. By shifting the reflecting elements and the exciter, the axis of the radiation pattern can be aimed in any direction. The antenna exciter is made in two versions: These are in the form of a parabolic-segment reflector (cheese-type) and in the form of a parabolic cylinder.

This telescope makes it possible to realize a directivity pattern with an angle of 1.2 minutes in the azimuth plane and an angle of one degree in elevation plane, for a wave length of 3 centimeters. Telescopes of this type can be built with reflecting areas from 10^4 to 10^5 square meters. A sensitive receiver for 3.2 and 10 centimeter waves makes this telescope suitable for the observation of discrete radio wave sources. ("New High-Resolving Power Radio Telescope," by S. E. Khaykin and N. L. Kaydanovskiy, Main Astronomical Observatory, Academy of Sciences USSR; Moscow, Pribory i Tekhnika Eksperimenta, No 2, Mar-Apr 59, pp 19-24)

Large Radiotelescope Built in Serpukhov Radiophysical Station

One of the largest radiotelescopes will be the one being built at the Serpukhov Radiophysical Station of the Physics Institute imeni P. N. Lebedev. This instrument will have a reflector diameter of 22 meters. Its design was developed under the supervision of specialists of the institute, by a number of institutes.

The new radiotelescope is a metallic, revolving paraboloid mounted on a rigid rotating support. Electric driving gears make it possible to direct the axis of the radiotelescope at practically any point in the celestial sphere. It is equipped with an optical sigh for visual observations. The observers and the sensitive receiving apparatus are located in a cabin arranged inside the horizontal axis of rotation of the reflector. This cabin is in the form of a hollow tube with a diameter of 2 meters and a length of 6 meters. The main control panel and the recording apparatus are situated in the main cabin-laboratory which is established in the turning installation.

The accuracy in the manufacture of the surface of the paraboloid makes it possible to conduct various investigations of extra terrestrial objects in the centimeter and decimeter ranges of radio waves, in particular, of the Sun, the Moon, planets, radio nebulae, and interstellar hydrogen.

The resolving power of the radiotelescope in the 3 centimeter wave consists of about 6 angular minutes. This makes it possible, for example, to obtain sufficiently the detailed distribution of radio brightness according to the Sun's disk, its so-called "radio image," which is of great value for investigating the physical processes originating in the solar atmosphere.

The comparatively large area of the radio telescope's reflector makes it possible to concentrate the energy from many weak sources of radio-emission in its focus in a quantity sufficient for their detection with the aid of the latest sensitive radio apparatus.

The radiotelescope is being erected at present and will go into operation in the current year [1958]. ("Powerful New Radio Telescope," by A. Ye. Salomonovich; Moscow, Vestnik Akademii Nauk SSSR, No 5, May 58, pp 130-131)

Recent Solar Activity Described by Moscow Planetarium Lecturer

Several very powerful explosions -- flares on the Sun -- were recently recorded by several astronomical observatories in the Soviet Union and other states. They were in the form of sharp increases in the brightness of specific areas.

The most recent period of maximum solar activity occurred in 1957. A drop in solar activity has now begun but isolated "splashes" continue. In the last 3-4 months, the northern hemisphere of the solar disk has been very active. In February, for example, a gigantic prominence was observed in the higher latitudes. The height of this "fountain" was almost 500,000 kilometers.

The Sun again became "agitated" at the beginning of May. On 9 May at 0153 hours Moscow Time, the Far East Station of the Sun Service recorded an enormous flare. Its brightness exceeded the brightness of the Sun's surface by several times. At the same time, the eruption of a gigantic prominence was also discovered, separated streams of which moving at a speed of 450 kilometers per second, reached a height of 600,000 kilometers. A flare recorded on 13 May at the Khar'kov Observatory lasted 238 minutes.

Strong flares were observed on the Sun at 0800 and 1000 hours Moscow Time on 17 May and at 1640 hours on 19 May. A large group of sunspots passed through the Sun's central meridian on 21 May. ("Explosions on the Sun," by L. Lutskiy, lecturer at the Moscow Planetarium; Moscow, Izvestiya, 23 May 59, p 4)

Study on the "Rotation" Temperature of Hydroxyl OH in the Upper Atmosphere

Temperature was determined by the spectral method according to the emission spectrum of hydroxyl OH for which the vibration-rotation bands in the ^2P-^2P state were observed in night airglow. Part of these bands in the 5,900-6,000 Angstrom region and in the 8,300-9,100 Angstrom region were used for evaluating temperatures. Spectra were obtained on spectrographs oriented to the north at an angle of 30 degrees to the horizon with exposure times of 10-12 hours, for an angle of the setting Sun above 18 degrees, in clear of cloudy weather. The observations were conducted at 55 43 N and 35 53 E.

The method of determining temperatures according to the hydroxyl OH spectrum is based on the assumption that the distribution of intensity in the branches of the rotation band is connected with temperature "excitations."

Examples of graphs, according to which the temperature for intense branches and the values of temperatures for different days are derived, are given. From these it can be seen that the average temperature for the 9.3 OH band is equal to T = 240 ± 20 degrees Kelvin. The temperature, calculated according to spectra obtained at the North Scientific Station (Murmansk, 68 15 N) gives an average value of T = 300 degree Kelvin. The possible error of measurement (due to the sensitivity of the photoemulsions) is 10 percent. An increased value in temperature in the high

latitudes (T = 300-503 degrees Kelvin) in comparison with the middle latitudes (T = 260 degrees Kelvin) was noted. ("Determination of the 'Rotation' Temperature of Hydroxyl in the Upper Atmosphere," by V. S. Prokudina, Institute of the Physics of the Atmosphere, Academy of Sciences USSR; Moscow, Izvestiya Akademii Nauk SSSR, Seriya Geofizicheskaya, No 4, Apr 59, pp 629-631)

Theory on Cloud and Vapor Trail Formation Advanced by Soviet Scientist

This article presents a method of calculating the water content of clouds (including vapor trails of aircraft) produced under the influence of mixing, as well as the conditions of formation of such cloud forms.

The plotted results of the calculation indicate various values of dew points, i.e., the isotherms of the dew points, rather than of the freezing points, and give a visual indication of the conditions necessary for the formation of clouds under the influence of mixing. Other curves provide a method of determining the water content of clouds (or vapor trails) produced by mixing. ("On the Theory of the Formation of Clouds and Aircraft Vapor Trails Under the Influence of Mixing," by L. T. Matveyev; Leningrad, Meteorologiya i Gidrologiya, No 3, Mar 59, pp 3-9)

Study on Relation of Vertical Temperature Gradients to Tropopause Height

On the assumption that, in an article on the reasons for variations of the location of the tropopause, Volkonskiy (Meteorologiya i Gidrologiya, No 12, 1957) refutes his own conclusions based on the hypothesis of substantiality for the vertical velocities of the daily fluctuations of the tropopause, this article investigates the adiabatic factors of the change in vertical temperature gradients resulting in fluctuations of the tropopause.

During local variations of the vertical gradients in which adiabatic processes are involved, the following occur: (1) advections of the vertical gradients of temperature (both horizontal and vertical); (2) advections of temperature; (3) local variations of pressure; (4) vertical motions; and (5) dependence of the vertical component of velocity on altitude. Since the fundamental criterion for the determination of the height of the tropopause is the value of the vertical temperature gradient, the fluctuations of the height of the tropopause during adiabatic processes depend on the same factor. The vertical gradient of temperature would change at a given geographical region at a given altitude, if the mass of air should shift without undergoing any deformation or change of composition. In such a case, the variation of the altitude of the tropopause would emanate exclusively as a result of a shift from areas where the altitude was different. Thus, the reason for the variation of the vertical temperature gradients (thus, the change of height of the tropopause) is not connected with the hypothesis of substantiality.

The vertical gradients decrease in given geographical regions at a given altitude also as a result of the fact that the velocity and temperature are functions of altitude, i.e., are due to varying intensity of the advective variations of temperature at various levels of a layer with an invariable vertical temperature gradient. Thus, the changes of the vertical gradients of temperature resulting from the deformation of air particles, and their compressibility, must be taken into account. With an increase of pressure and descending flows, the vertical gradient decreases and, as a consequence, the tropopause lowers; when pressure decreases, and flows are ascending, the vertical gradient increases, and the tropopause rises. The summary effect of all three factors is a rise of the tropopause, which is further reinforced by advections which, in the leading edge of the cyclone and the trailing edge of the anticyclone, are directed almost due south, i.e., out of areas where the tropopause is higher.

The author points out, but does not further treat, the fact that one of the reasons for the variation of the vertical gradients of temperature is turbulent heat exchange and radiational heat transfer (including direct solar radiation, the effect of which is usually manifested in the boundary layers), factors which may lead to a considerable reorganization of the curves of stratification in the vicinity of the tropopause. ("Changes of the Vertical Gradients of Temperature and Fluctuations of the Height of the Tropopause," by B. Ya. Slobodov; Leningrad, Meteorologiya i Gidrologiya, No 3, Mar 59, pp 41-43)

Unusual Frosts in Crimea Reported

In the period 7-9 June 1958, there was a sharp temperature drop in the Crimea. On 7 June, the midday temperature of the air dropped 10-12 degrees from that of the preceding day. On the following day, the cold snap continued to intensify. During the early morning hours of 8 June, frosts were recorded at an altitude of 900—1,200 meters in the mountains, and on 9 June, there were frosts in a number of areas in the central steppes and foothills.

The frost was greatest, both in intensity and in scope, in the early morning hours of 9 June, when the temperature dropped to minus 0.2 degree [centigrade] in Voronkakh (steppe), to zero in Belogorsk (foothill), and to minus 2.0 degrees in Ay-Petri.

In the Krasnogvardeysk (Klepinino), Belogorsk, Nizhnegorsk, Simferopol', and Sudaksk areas, the frosts did considerable damage to agricultural crops (leaves and stalks of corn, clusters, and leaves of grapes). ("Unusual Spring Frosts in the Crimea," by D. V. Burtsev; Leningrad, Meteorologiya i Gidrologiya, No 3, Mar 59, p 40)

V. SEISMOLOGY

Study on Rayleigh Wave Propagation

In an investigation of the influence of a spread source on the propagation of Rayleigh waves, exact formulas are derived for the static portion of the field of a Rayleigh wave. Formulas are also given for the components of the Rayleigh wave field which are far removed from the source and which vary more readily.

The Rayleigh wave, which is excited, on the one hand, by the spread source and, on the other hand, by the point source, has two principal fields, which differ essentially in the area of discontinuity of the wave caused by the point source.

With the theoretical assumption that the spread source is on the surface of a completely elastic, homogeneous, and isotropic half-space the radius of the source can be determined on the basis of observations of the behavior of the Rayleigh wave with respect to time. ("Theory of Waves Excited in an Elastic Half-Space by a Spread Source," by K Pec, Geophysics Institute, Karls University, Prague; Prague, Studia Geophysica et Geodaetica, Vol 2, No 3, 1959, pp 135-153)

Second Expanded Seminar of the Division of Seismology and the Seismic Service of the Institute of the Physics of the Earth

The second expanded seminar of the Division of Seismology and the Seismic Service devoted to the results of the study of surface waves was held in the Central Seismic Station, Simferopol', from 21-23 October 1958.

In the work of the seminar, 24 associates participated from the divisions of Seismology and the Seismic Service and Mathematical Geophysics, the Pulkovo and Simferopol' central seismic stations, the Yalta and Alushta geophysical stations, the Institute of the Physics of the Earth Academy of Sciences USSR (IFZ, the Geological Institute of the Academy of Sciences Azerbaydzhan SSR, the Chair of Physics of the Earth's Crust of the Physics Faculty of the Moscow State University, and the Laboratory of Regional Seismology of the Institute of Geophysics of the Academy of Sciences, Georgian SSR.

Eleven reports and papers were presented. The session was opened by Ye. F. Savarenskiy, chief of the Division of Seismology and the Seismic Service, whose introductory words and report were on the theme, "Determination of the Observation of Phase and Group Velocities of Surface Waves."

Interpretations of the observations on surface waves is a rather complex problem. In addition, the experimental determination of dispersion curves of the group and phase velocity makes it possible to determine the average value of the thickness of the Earth's crust, its layers, and in recent times, of the Earth's mantle. Examples of the experimental determination of phase and group velocities of surface waves according to observational data, were given by the author, on which group velocities can be determined according to the recordings of one, as well as the recordings of two nearby stations. An estimate of the accuracy of this determination (the problem was considered analytically) was made.

Sh. S. Ragimov (Azerbaydzhan SSR) presented a paper on the determination of the group and phase velocities of Rayleigh waves in the Shemakha-Kirovabad-Goris tripartite stations. The presence of seismic stations located close to one another, the distances between which are small compared to the epicentral distances, made it possible to reliably determine the magnitude of the group velocity of surface waves and to estimate the accuracy of these determinations. The average thickness of the Earth's crust between the Caucasus and the Aleutian and the Kuril Islands (35 kilometers) was determined according to these data. The determination of the phase velocities of surface waves according to the observations of the adjacent stations made it possible to estimate the thickness of the earth's crust in the region where the Goris, Kirovabad, and Shemakha stations are located (50-55 kilometers).

Two reports were devoted to a review of the work on surface waves.

A review of theoretical works devoted to the study of interference waves was given by T. B. Yanovskaya ("Pulkovo Central Seismic Station). The greater part of the investigations dealt with the study of the dispersion properties of interference waves, since a knowledge of dispersion is necessary for studying their dynamic characteristics. Stationary waves as well as waves propagated from a nonstationary source were considered. Two methods of solving the problem on the dispersion of interference waves were briefly presented: (1) a method of separation of variables and (2) a method of superposition.

The results of the investigation of dispersion in separate particular cases were considered: (1) plane parallel layers in a homogeneous half-space -- (a) a layer in a half-space, and (b) two plane parallel layers in a half-space; and (2) other cases -- (a) a wedge-shaped stratum, and (b) a heterogeneous half-space and a layer in a heterogeneous half-space.

V. M. Arkhangel'skaya (IFZ) presented a review of foreign experimental work on surface waves. The author dwelt on works of the last 5-10 years reflecting the present state of the problem of studying the structure of the Earth's crust according to observations of surface waves and

the explanation of the singularity of this determination according to dispersion. The results of the determination of the structure of the oceanic crust of the Earth in the basins of the Pacific and Atlantic Oceans, the continental crust of the Earth of Africa, of North America and of Europe, were presented which arrive at the conclusion of the extraordinary uniformity of the structure of the Earth's crust both within the continental limits as well as within the limits of the oceanic basins.

Investigations of surface waves give a concrete and independent method of studying the Earth's crust and of studying regions inaccessible to the method of refracted waves.

N. V. Zvolinskiy (IFZ) and D. N. Sikharulidze (Georgian SSR) presented a paper on the construction of dispersion curves for Love waves in a two-layer model of the Earth's crust. They reported on systematic calculations of the phase and group velocities of Love waves for a double-layer lying in a half-space which were conducted. The calculations were conducted with the aim of explaining the degree of ambiguity in the interpretation of the results of observations for determining the structure and thickness of the Earth's crust. In particular, by means of comparison with the dispersions in a single-layer model of the crust, it is necessary to explain under what conditions the interpretation of observations on Love waves does not present the possibility of distinguishing the unilayered structure of the crust from a double-layered structure. The systematic conduct of calculations of dispersion is a time-consuming task which can be lightened if the equations of dispersion can be presented in a convenient form for the calculations. For this reason the authors used the form of dispersion equations for Love waves which N. V. Zvolinskiy obtained in an earlier published work (Trudy Instituts Geofiziki AN GruzSSR, Vol XVII, 1958). Calculations of phase and group velocities are presented for 5 versions of the relation between the velocities of the propagation of transverse waves: I--$b_1/b_3 = 0.4$, $b_2/b_3 = 0.6$; II--$b_1/b_3 = 0.4$, $b_2/b_3 = 0.8$; III--$b_1/b_3 = 0.6$, $b_2/b_3 = 0.7$; IV--b_1/b_3 0.7, b_2/b_3 0.8; V--b_1/b_3 0.8, b_2/b_3 0.9.

Three cases of the ratio between thicknesses of the upper and lower layers were calculated for each of the indicated versions: 1/4, 1/1,4/1. The ratio of the densities of the media in all cases was accepted as $\rho^1 : \rho^2 : \rho^3 = 9:10:11$.

D. P. Kirnos' (IFZ) report on the results of work on the creation of instruments for the observation of surface waves was presented in written form. The development of a model of a vertical seismograph for registering long-period seismic waves was described by the author.

Ye. F. Savarenskiy then came forward with a paper on the report of F. Press and Kh. Ben'ofa on long waves. A long-period seismograph capable of registering oscillations of Rayleigh waves in the Earth's mantle up to 8 minutes is described and the results of the construction of dispersion curves of the group velocities of Rayleigh waves in a whole range of periods are presented. For oscillations with a period larger than 75 seconds, dispersion is subjected to the influence of the total waves in the mantle and the solidity in the boundary of the nucleus which tends toward zero.

A second report by N. V. Zvolinskiy was devoted to the variation method of studying the dispersion of Love waves. The work's purpose is the compilation of an approximate equation for the dispersion of Love waves for the case of a double layer lying in a half-space. An exact equation requires a great deal of work in its use for calculating the law of dispersion. Therefore, it is desireable to have a simpler although approximate equation. The motion of the Love-type surface sinusoidal waves is characterized by this property--it imparts the least value of potential energy (calculated in long waves) with a fixed value of kinetic energy. This property makes it possible to plot the motion of Love-type surface waves as a solution of the variation problem. Such a solution, in particular, can be obtained by the direct method. Such a solution is presented in the report, which was obtained with the aid of the expansion of the desired functions (displacements) in a Fourier series. By such means an exact equation for dispersion is first obtained, however, in a new form. In addition to the exact equation, two approximate equations for dispersion were obtained by the authors: one giving values of phase velocity which are too large, and the other, values which are too small. Both of these equations are simpler than the exact equations. The methods of obtaining the approximate equations are the usual in variation calculations. For obtaining a correct estimate, it is necessary to narrow the class of admissable functions of the problem; for obtaining an approximate estimate it is necessary, on the contrary, to expand it.

Reports by Ye. F. Savarenskiy (IFZ) and L. N. Rykunov, T. A. Proskuryakov, and V. M. Prosvirin (MGU) were devoted to the problem of the influence of Scandinavia's relief on the propagation of microseisms. The study of the field of the periods and the amplitudes of the microseisms, and the sources which are located near the northwest Scandinavian shore showed that seismic stations with azimuths at the source, which are standard or tangent to the shore line, register more intensive microseisms in comparison to stations in other azimuths. The authors explain the noted pecularity in the passage of microseisms by the influence of the Scandinavian relief, the characteristic property of which is the dissected nature of its topography, of river valleys and elongated lake depressions lying almost parallel to one another in a direction perpendicular to the northwestern shore. An estimate of

the degree of like effect and the plausability of such an explanation was made by the method of modeling. The influence on the propagation of Rayleigh waves by two basic elements of the Scandinavian relief was studied on the model: (1) the transition from the bottom of the ocean to the continent (stage) and (2) the river valleys which stretch along a normal to the shore. The results confirm the effects of the "shore stage" and the alternating river valleys.

The results of work on the determination of the azimuth at the epicenter according to the amplitude of the surface waves was described in a report by N. Pavlov. (Moscow State University).

Two reports were devoted to the question of the state and problems on the observation of surface waves in Crimea.

In I. I. Popov's ("Simferopol Central Seismic Station") report, all the possible methods of observation (recordings) of surface waves in the Crimea were explained. To these belong the usual observations of seismic stations equipped with general type seismographs; recordings obtained with the aid of three precisely identified vertical seismographs of the vertical type established in the Simferopol'; Yalta, and Alushta stations, the distance between which is about a wave length; observations by tripartite stations, the apparatus of which is adjusted for automatic recording during strong earthquakes; and the recordings of surface waves. Experimental works are being conducted on the creation of a horizontal long-period seismograph.

V. T. Arkhangel'skiy (Yalta" Geophysical Station) reported on the theory of the long-period seismograph and its development.

For developing new vertical seismographs suitable for registering long-period waves, it is necessary to produce a long-period pendulum, for a vertical seismograph, guaranteeing a stable period of free oscillations of not less than 30-50 seconds. The author shows that the dependence of the period on the position of the balance and amplitude is determined both by the initial length of the supporting spiral spring, as well as the form of the force triangle formed by the two points fastening the spiral spring and the pendulum's axis of rotation. In a general case, the returning moment in addition to the term of the first degree of displacement, contains terms proportional to the second and third degrees of displacement. The last also determine the dependence of the period on the position of the balance and the amplitude. The results of studies of equations of motion, ensuring large periods for the pendulum of a vertical seismograph were presented. A model of a long-period pendulum was recently developed and experiments on a simplified experimental model were conducted.

The final session of the seminar was devoted to a discussion of the state of the problems and the adoption of resolutions.

Participants in the seminar noted that a number of new results on the theory of surface waves and the interpretation of observations of surface waves were obtained since the first similar seminar (Moscow, December 1957). Observations on Rayleigh and Love waves within the spectral limits of the periods of existing general-type seismic stations were intensified.

Despite the number of achievements, the gathering considered it necessary to note a marked absence in the development and introduction of apparatus for the observation of extra-long waves. The participants of the seminar also considered it necessary to intensify the further introduction of methods of interpreting observations on surface waves in USSR seismic stations and to accelerate a wider familiarity of USSR seismologists with contemporary achievements in the field of the study of surface waves both in the USSR as well as abroad. ("Second Expanded Seminar of the Division of Seismology and the Seismic Service of the Institute of the Physics of the Earth Devoted to the Study of Surface Waves," by V. M. Arkhangel'skaya; Moscow, Izvestiya Akademii Nauk SSSR, Seriya Geofizicheskaya, No 4, Apr 59, pp 638-639)

VI. OCEANOGRAPHY

Deep Sea Photography at 2,430 Meters

Photographs by the staff of the Soviet expeditionary ship Mikhail Lomonosov were made at a depth of 2,430 meters. The ship is now in the Atlantic Ocean. ("From Everywhere About Everything"; Moscow, Izvestiya, 23 May 59, p 4)

VII. ARCTIC AND ANTARCTIC

Solar Halo and Mock Suns Seen at Vostok Station

At the Vostok Station, located in Antarctica near the geomagnetic South Pole, a very interesting optical phenomenon was observed in the atmosphere on 14 December 1958.

At 0730 (Moscow time) a circle (halo) appeared around the Sun at an angle of 22 degrees. At 0810, two mock suns appeared on the periphery of the halo; through them passed arcs, forming an ellipse around the halo. Then a belt, in which the images of the two mock suns were c repeated, was formed and extended over the entire firmament.

At 0820, a second halo appeared at an angle of 46 degrees, with almost the entire upper semicircle visible and the lower semicircle visible only at three separate places. At this time, only part of the belt, in the vicinity of the halo, was visible. Within 5 minutes, the circle at 46 degrees disappeared, but the inner halo (at 22 degrees) with the mock suns and the ellipse persisted. The belt appeared and disappeared several times between 0845 and 0906.

"At 0915, the halo and the ellipse began to disappear, but the false suns remained visible for 15 minutes.

"During this time, the sky was covered with thin, translucent, cirrostratus clouds. Below them, at an altitude of 800-1,000 meters, disconnected stratus clouds were moving rapidly from south to north. The air temperature was minus 30.8 degrees [centigrade], and the relative humidity was 79 percent.

"Ice crystals were falling out of the cirrostratus clouds. When examined under the microscope, they revealed small star shapes with from 3 to 8 separate rays and were completely unlike snow flakes which fall in the temperate zone.

"The formation of the belt can be explained, apparently, by the presence of the cirrostratus clouds and the opportune distribution of the crystals of the above-described form. The halo phenomenon with several false suns (up to six) is characteristic of Central Antarctica."

("Interesting Optical Phenomenon in Antarctica," by P. F. Mitin, Vostok Station, Antarctica; Leningrad, Meteorologiya i Gidrologiya, No 3, Mar 59, pp 39-40)

New Drift Station Severnyy Polyus-8, Begins Operations

The newly established scientific drift station Severnyy Polyus-8 has begun transmitting radio signals. The station was organized on a large ice floe, 3 by 4 kilometers in size, 690 kilometers northeast of Ostrov Vrangelya and 980 kilometers from the northern shore of the Chukot Peninsula. The first weather report from the station was transmitted to the mainland on 28 April.

The ice floe with the station Severnyy Polyus-8 began its drift at a point 5 degrees east of the spot where station Severnyy Polyus-2 was organized in 1950. During the first 10 days, Severnyy Polyus-8 drifted more than 25 miles to the northwest. This speed of movement is quite considerable for this area of the Arctic Ocean. Scientists of the Arctic and Antarctic Institute assume that the ice floe of Severnyy Polyus-8 will be caught up in a so-called anti-cyclonic current and will reach the little explored regions of the Arctic Ocean. If this happens, the drift of Severnyy Polyus-8 will be of great scientific value. ("There Is a New Drift Station!" Leningradskaya Pravda, 29 Apr 59)

Chief of Severnyy Polyus-8 Reports

Between 27 and 28 April, the USSR state flag was raised at the new drift station Severnyy Polyus-8, located at a point with coordinates 76-11 N and 164-24 W. In a radio interview with the editor of Izvestiya, V. Rogachev, chief of the new station, reported on conditions at Severnyy Polyus-8.

During the short period since the first plane landings were made on the ice floe by P. Moskalenko, Ya. Dmitriyev, and M. Zav'yalov, it has already drifted 29 minutes to the north and one degree, 14 minutes to the west. The ice floe consists of old pack ice, which is about 3 meters thick. Its surface is fairly even. From the air, the ice floe appears oval-shaped.

The entire group of station staff members and cargo have now been delivered to the station by plane. ("SP-8 Is Speaking," Moscow, Izvestiya, 30 Apr 59)

Ice Reconnaissance Plane Returns

A Polar aviation airplane, piloted by the experienced pilot Lebedev, returned to Dikson from an extended flight over the ice of the Central Arctic Basin. The plane made a nonstop flight on the route Tiksi -- North Pole -- area of the former station Severnyy Polyus-7 -- station Severnyy Polyus-6 -- Ostrov Rudol'fa -- Dikson. The plane was in the air about 13 hours, covering a distance of over 5,000 kilometers.

The group of polar specialists on board the plane, headed by Volkov, chief of the weather bureau of the Arctic and Antarctic Institute, studied ice conditions of the Central Arctic Basin. During four previous flights, they inspected about 25,000 kilometers of ice fields. Ice reconnaissance enables the scientists to revise their long-range forecasts for the 1959 arctic navigation season. ("On Ice Reconnaissance," Riga, Sovetskaya Latviya, 25 Apr 59)

Return of Arctic Expeditions

The members of the high-latitude scientific expedition, headed by V. G. Kanaki, have returned from the Arctic. During a one-month period, the expedition members, flying in planes piloted by M. P. Stupishin and N. D. Polyakov, were engaged in installing radio beacons and drifting automatic meteorological stations on the ice. Such stations have been installed at 24 points of the Arctic Ocean and are now regularly transmitting radio signals and weather data. The information is received by the coastal Arctic radio stations. During landings on the ice, the expedition conducted complex hydrological and glaciological work.

Another air expedition of the Arctic and Antarctic Institute also returned to Leningrad on 27 April. This expedition conducted ice reconnaissance in the Central Arctic Basin, including the region near the North Pole. Candidate of Geographical Sciences N. A. Volkov, chief of the expedition, told a Tass correspondent that the airplane covered a distance of about 40,000 kilometers, from the Greenland Sea to the Beaufort Sea. The expedition studied ice conditions, determining the distribution of the ice, extent of hummock formation, etc., and took many aerial photographs.

The data obtained by the expedition will be used in revising long-range ice forecasts for the approaching navigation on the Northern Sea Route. ("Return of Scientific Expeditions from Arctic," Moscow, Pravda, 28 Apr 59)

Scientists Study Antarctic Ice Cover

Soviet scientists in Antarctica have given a great deal of attention to studies of the ice thickness. The results of observations conducted along the route from Mirnyy to the pole of relative inaccessibility were of special interest. It was established that the greatest depression, with depths to 900 meters below sea level, is located 475 kilometers south of Mirnyy. This depression is 150 kilometers wide. Further on, as far as the pole of relative inaccessibility, the subglacial foundation

is above sea level. The only exception is the area of station Komsomol'skaya, where the basic rocks are several tens of meters below sea level. Here the subglacial relief is very irregular and represents a mountainous structure, covered by the ice cap.

The greatest ice thickness, about 4,000 meters, was found in the area of the depression south of Pionerskaya. The least thickness, about 800 meters, is 300 kilometers southwest of Sovetskaya. Here the elevation of the subglacial mountain peaks reaches 3,000 meters above sea level.

Thus, it may be considered as definitely established that Antarctica is not an archipelago, but a continent with numerous mountain systems and depressions, covered by a heavy ice cap. ("News from Antarctica," by Ye. Tolstikov, Moscow, Sovetskiy Flot, 9 Apr 59)

Station Vostok Prepares for Polar Night

The station Vostok is preparing for the polar night. On 22 April, the sun will appear for the last time above the horizon and will then disappear for 4 months.

In 1959, the station Vostok received new equipment. A spectral camera for observations of auroras and magnetographs have been installed. A first-class magnetic laboratory is buried deep under the snow. New automatic equipment for recording quick variations of the magnetic field and for absolute magnetic observations has been installed in five separate magnetic "pavilions" connected with each other by a 50-meter long passage. Over 100 cubic meters of snow had to be removed to the surface for the construction of these "pavilions."

During the past few days, the approach of winter has become more noticeable; snowstorms and fogs have become more frequent, and the temperature is dropping constantly. During the night, Ye. Ya. Yevseyev, meteorologist, registered a temperature of minus 72.1 degrees centigrade. The clock mechanisms of self-recording devices failed to work, the frost-resistant ink grew hard, and iron became brittle like glass. Wires were destroyed and diesel fuel froze.

During the evenings, auroras are frequently observed, lighting up the sky with a pale-green brilliance. ("Before the Polar Night," Moscow, Izvestiya, 18 Apr 59)

Soviet Geologists Explore Queen Maud Land

Prof M. G. Ravich, chief of the geological detachment of the Fourth Antarctic Expedition, reported in an interview with a Tass correspondent that Soviet scientists in Antarctica had explored a vast mountain region, located about 150-200 kilometers from the new Soviet station Lazarev, on Queen Maud Land. It was established that the mountains in this region rise one to 2 kilometers above the ice cap, and that the ice thickness is 2 to 3 kilometers.

The peaks of these mountains have never been covered by glaciers. The collected data present proof of the evolution taking place in the movement and size of the glaciers of East Antarctica. It was possible to find traces of an ancient glaciation, which was only 500-700 meters higher than the present level of glaciation.

Patches of green moss and orange-colored lichens were found at a height of 2,700 meters above sea level. This is explained by the fact that the mountains absorb a large quantity of solar heat in the summer. Thus, on 20 February, during the afternoon, when the air temperature was minus 10 degrees centigrade, the rocks at the peaks were heated to a temperature of plus 10 degrees. Nests of snowy petrels were also found on these peaks. ("Discoveries of Soviet Geologists on the Ice Continent," Baku, Bakinskiy Rabochiy, 28 Apr 59)

Sled-Tractor Train Heads South

In the past few days a group of polar scientists of the Fourth Antarctic Expedition, headed by scientific associate S. Shcheglov, left Mirnyy on two "Pingvin" tractors, heading south towards the interior. This is the first time a sled-tractor train has left at this time of the antarctic fall. The route of the train is Mirnyy -- Pionerskaya.

In addition to gravimetric observations, the expedition will conduct a series of observations in glaciology and meteorology. A distance of 60 kilometers has already been covered. The loose snow, one-meter high sastrugi, and the continuous heavy purga, are hampering the progress of the train. Special stoves have been installed on the tractors. During the traverse, radio contact is maintained between the vehicles and the stations Mirnyy, Vostok, and Lazarev, with the help of special radio installations. The work of the train is to be completed by the end of May. ("Pingvins Are Moving South," Moscow, Komsomol'skaya Pravda, 26 Apr 59)

Swedes Award Medal to Soviet Scientist

Recently, the Swedish Society of Anthropology and Geography awarded the "Vega" medal to the well-known Soviet polar scientist, M. M. Somov.

Somov has been studying the Arctic regions since 1938. He became Doctor of Geographical Sciences in 1954. He took part in the first trans-Arctic nonstop flight, Tiksi -- North Pole -- Mys Kosistyy. Somov was a member of most high-latitude air expeditions to the region of the North Pole. He was among the first to land at the North Pole in 1948.

Somov headed the scientific drift station Severnyy Polyus-2, organized in 1950. The Soviet government awarded him the title of "Hero of the Soviet Union" for his achievements in the study of the Arctic.

When the Soviet government decided to participate in the study of the Antarctic under the IGY program, M. M. Somov was appointed chief of the Soviet Complex Antarctic Expedition. Under his immediate supervision, the Soviet polar scientists established the observatory at Mirnyy, the main Soviet base, as well as the first interior stations in Antarctica. Somov spent over a year with the members of the First Antarctic Expedition, participating in many interior train expeditions and flights over Antarctica.

The "Vega" medal, which was established in memory of the well-known polar expedition of Nordenskiold on the ship Vega, is the highest honor awarded by the Swedish Society of Anthropology and Geography. ("Honorary Award," Moscow, Sovetskiy Flot, 4 Mar 59)

Soviets Name Geographic Points in Antarctica

The members of the Third Antarctic Expedition, which returned from the Antarctic, have entered 17 new geographic names on the map of Antarctica. One of the capes in Antarctica was named after Murmansk, the home port of the expedition ship Ob'. ("Ob' Arrives in Home Port," Moscow, Sovetskaya Rossiya, 21 Apr 59)

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